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(FILE 'HOME' ENTERED AT 12:04:36 ON 12 SEP 2005)

FILE 'CA' ENTERED AT 12:04:51 ON 12 SEP 2005

L1 1467122 S (PARTICLE OR PARTICULATE OR COLLOID? OR NANOPART? OR NANOCRYST?
OR NANOCLUST? OR CLUSTER OR NANOASSEMB? OR NANONETWORK? OR
NANOSCALAR)
L2 11425 S L1(7A)(THIOL? OR ALKANETHIOL? OR ALKYLTHIOL? OR MERCAP? OR
AMIN?)
L3 26463 S L1(6A)(STABILIZ? OR STABILIS? OR SELF ASSEMBL? OR PASSIVAT? OR
PROTECT?)
L4 1359 S L2 AND L3
L5 824 S L4 AND(COPPER OR CU OR GOLD OR AU OR SILVER OR AG OR PLATINUM OR
PT OR PALLADIUM OR PD)
L6 3332 S L3(7A)(COPPER OR CU OR GOLD OR AU OR SILVER OR AG OR PLATINUM OR
PT OR PALLADIUM OR PD)
L7 163 S L1(7A)(DITHIOL? OR ALKYLDITHIOL? OR ALKYLENEDITHIOL? OR
ALKENEDITHIOL? OR ALKYLENETHIOL? OR ALKENETHIOL? OR (ALKYL OR
ALKYLENE OR ALKENE)(2A)DITHIOL?)
L8 24 S L4 AND L7
L9 32 SL7(10A)(LINK? OR SUBSTITUT? OR REPLAC? OR EXCHANG? OR DISPLAC?
OR BIFUNCTION? OR DIFUNCTION? OR HETEROFUNCT?)
L10 258 S L4 NOT PY>1997
L11 74 S L5 AND L10
L12 37 S L4 NOT L10 AND PATENT/DT AND PY<1999
L13 1076 S L6 NOT PY>1997
L14 1020 S L13 NOT L8-9,L11
L15 6 S L14 AND(DITHIOL? OR ALKYLDITHIOL? OR ALKYLENEDITHIOL? OR
ALKENEDITHIOL? OR ALKYLENETHIOL? OR ALKENETHIOL? OR (ALKYL OR
ALKYLENE OR ALKENE)(2A)DITHIOL?)
L16 65 S L14 AND (THIOL? OR MERCAP? OR AMIN?)
L17 23 S L10 AND (DIMENSION? OR BIFUNCTION? OR DIFUNCTION?)
L18 152 S L8-9,L11,L15-17 NOT PY>1998
L19 189 S L12,L18

=> d bib,ab l19 1-189

L19 ANSWER 24 OF 189 CA COPYRIGHT 2005 ACS on STN
AN 128:209367 CA
TI **Self assembly** of nanosized **gold clusters** into regular arrays
AU Fink, J.; Kiely, C. J.; Bethell, D.; Schiffrin, D. J.
CS Department of Materials Science and Engineering, University of
Liverpool, Merseyside, L69 3BX, UK
SO Institute of Physics Conference Series (1997), 153(Electron Microscopy
and Analysis 1997), 601-604
AB Stable solns. of un-derivatized and **thiol**-derivatized nano-sized **Au**
colloids in toluene were prepd. A drop of the colloidal soln. when
allowed to evap. onto a C grid, forms self-assembled superstructures
which were examd. with transition electron microscopy. In monolayer
form, the **Au** particles assemble into highly ordered pseudo-hcp. rafts in
which the interparticle sepn. can be controlled by varying the size of
the stabilizing species attached to the **Au** surface. When allowed to
form bilayers, the **Au** particles adopt corrugated chain- and ring-like
structures in addn. to normal, close-packed stacking sequences.

Possible origins of these unusual stacking phenomena are discussed.

L19 ANSWER 27 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 128:96021 CA

TI Layer-by-layer **self-assembly** of composite films of CdS **nanoparticle** and alkanedithiol on **gold**: an x-ray photoelectron spectroscopic characterization

AU Nakanishi, Takuya; Ohtani, Bunsho; Shimazu, Katsuaki; Uosaki, Kohei
CS Graduate School of Science, Division of Chemistry, Physical Chemistry Laboratory, Hokkaido University, Sapporo 060, Japan

SO Chemical Physics Letters (1997), 278(4,5,6), 233-237

AB Layer-by-layer self-assembly of composite thin films of Cd sulfide (CdS) nanoparticle and alkanedithiol was achieved on a Au substrate by an alternate immersion into solns. of **dithiols** (1,6-hexanedithiol and 1,10-decanedithiol) and soln. contg. CdS nanoparticles (~3 nm in diam.). The layer-by-layer structure was confirmed by angle-resolved XPS at each composite-film prepn. step. The proposed structure and mechanism of self-assembly were in agreement with previous results obtained by FTIR reflection-absorption spectroscopy.

$\alpha\beta$ L19 ANSWER 35 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 127:311752 CA

TI Poly-hetero- ω -functionalized **Alkanethiolate-Stabilized Gold Cluster** Compounds

AU Ingram, Roychelle S.; Hostetler, Michael J.; Murray, Royce W.

CS Kenan Laboratories of Chemistry, University of North Carolina, Chapel Hill, NC, 27599-3290, USA

SO Journal of the American Chemical Society (1997), 119(39), 9175-9178

AB This paper describes two synthetic approaches, simultaneous and stepwise exchange, to poly-hetero- ω -functionalized monolayer-**protected cluster** compds. (MPC's), as well their spectroscopic and electrochem. characterization. Poly-hetero- ω -functionalization of MPC's provides a framework within which to study intra- and intermol. cluster chem. and to design multistep, mutually supporting catalytic and electron donor/acceptor reactions on cluster surfaces. Factors affecting the extent of exchange (measured by NMR) include the steric bulk of the ω -functional group as well as the chain lengths of the protecting and incoming ligands. Poly-hetero- ω -functionalized clusters can incorporate mixed redox functions as illustrated by microelectrode voltammetry of a poly-ferrocene/anthraquinone mixed cluster. The cluster voltammetric waves lie at potentials consistent with those obsd. in dil. solns. of the unbound electroactive thiols, within the uncertainty of the **Ag** quasi-ref. electrode. Diffusion coeffs. and hydrodynamic radii suggest that the outer parts of the cluster chains may be free-draining. This research demonstrates that 3-**dimensional**-SAMS with mixed ω -functionalized alkanethiolate ligands (both redox and nonredox active) can be synthesized and characterized and provides the groundwork for synthesis of nanofactory cluster compds. designed to exhibit mutually supporting, multistep chem. and redox catalytic reactions and for an enhanced capacity to study functional group reactivities at organized monolayer interfaces.

L19 ANSWER 45 OF 189 CA COPYRIGHT 2005 ACS on STN
AN 127:56309 CA
TI Preparation of Functional Silane-**Stabilized Gold Colloids** in the (Sub)
nanometer Size Range
AU Buining, Paul A.; Humbel, Bruno M.; Philipse, Albert P.; Verkleij, Arie
J.
CS Department of Molecular Cell Biology, University of Utrecht, Utrecht,
3584 CH, Neth.
SO Langmuir (1997), 13(15), 3921-3926
AB A synthesis method is introduced for very small uniform **Au** particles
(diam. <5 nm), based on the redn. of H tetrachloroaurate(III) in EtOH in
the presence of (γ -mercaptopropyl)trimethoxysilane (MPS). The surface
layer of MPS mols. gives the **Au** particles a high colloidal stability and
allows in principle further reaction with any silane coupling agent.
Decrease of the HAuCl_4 :MPS ratio allows a controlled redn. of **Au**
particle size, resulting in remarkably uniform **Au** clusters of (sub)nm
size, obsd. with high-angle-annular-dark-field scanning TEM. After
attachment of (γ -aminopropyl)triethoxysilane (APS) to the MPS surface
layer, other mols. may be covalently bound to the **Au colloid** via the
amine group of APS. As an illustrative example, we prepd. in this
manner **Au** particles labeled with a fluorescent dye. The chem. structure
of the surface silanes was studied with FTIR spectroscopy.

L19 ANSWER 57 OF 189 CA COPYRIGHT 2005 ACS on STN
AN 126:136128 CA
TI Adsorption of Surface-Modified **Colloidal Gold Particles** onto Self-
Assembled Monolayers: A Model System for the Study of Interactions of
Colloidal Particles and Organic Surfaces
AU Fan, Hongyou; Lopez, Gabriel P.
CS Department of Chemical and Nuclear Engineering, University of New
Mexico, Albuquerque, NM, 87131, USA
SO Langmuir (1997), 13(2), 119-121
AB Self-assembled monolayers (SAMs) were formed from ω -substituted
alkanethiols, e.g. (1-mercaptoundec-11-yl)hexa(ethylene glycol) ($\text{HS}(\text{CH}_2)$
11-(OCH_2CH_2) $_6\text{OH}$) and 1-dodecanethiol ($\text{HS}(\text{CH}_2)_{11}\text{CH}_3$), on the surface of
planar **Au** films and on colloidal **Au** particles. A quant. method for
studying the phys. adsorption of SAM-modified **Au** colloids on the planar
SAMs was developed. XPS and SEM were used to measure the compn. of
planar SAMs and to quantify the extent of colloidal adsorption, resp.
Results confirm that the colloids studied adsorb from the aq. soln. more
extensively to hydrophobic surfaces, that the extent of adsorption
increases with particle hydrophobicity, and that oligo(ethylene glycol)
surfaces are resistant to colloidal adsorption. Colloidal **Au** particles
and flat **Au** substrates modified with SAMs form a convenient and
versatile model system for examg. existing theor. models assocd. with
the adsorption of colloids and proteins, and cellular attachment and
adhesion at solid surfaces.

L19 ANSWER 62 OF 189 CA COPYRIGHT 2005 ACS on STN
AN 126:109247 CA
TI Pressure/Temperature Phase Diagrams and Superlattices of Organically
Functionalized Metal Nanocrystal Monolayers: The Influence of Particle

Size, Size Distribution, and Surface Passivant

- AU Heath, James R.; Knobler, Charles M.; Leff, Daniel V.
CS Department of Chemistry and Biochemistry, UCLA, Los Angeles, CA, 90095-156905, USA
SO Journal of Physical Chemistry B (1997), 101(2), 189-197
AB The phase behavior of organically passivated 20-75 Å diam. **Ag** and **Au** nanocrystals was studied by examg. surface-area isotherms of Langmuir monolayers and transmission electron micrographs of Langmuir-Blodgett (LB) films. The effects of temp., org. passivant chain length, and nanocrystal size and compn. were studied. Three distinct types of phase behavior are obsd. which may be classified in terms of the extra (conical) vol. (Ve) available to the alkyl capping group as it extends from a nearly spherical metal core. For $V_e > 350 \text{ Å}^3$, the phase diagram is dominated by extended, low-**dimensional** structures that, at high pressures, compress into a 2-**dimensional** foamlike phase. This behavior is rationalized as originating from the interpenetration of the ligand shells of adjacent particles. For $V_e < 350 \text{ Å}^3$, dispersion attraction between the metal cores dominate particle condensation. For $350 \text{ Å}^3 > V_e > 150 \text{ Å}^3$, the particles condense to form closest packed structures, which, for sufficiently narrow particle size distributions, are characterized by cryst. phases. For $V_e \approx 30 \text{ Å}^3$, the particles irreversibly aggregate into structures similar to those expected from a diffusion-limited-aggregation model. Optical properties of certain LB films of the closest packed phases are reported.

αBL19 ANSWER 69 OF 189 CA COPYRIGHT 2005 ACS on STN

- AN 125:291641 CA
TI Self-assembly of a two-**dimensional** superlattice of molecularly linked metal clusters
AU Andres, Ronald P.; Bielefeld, Jeffery D.; Henderson, Jason I.; Janes, David B.; Kolagunta, Venkat R.; Kubiak, Clifford P.; Mahoney, William J.; Osifchin, Richard G.
CS School Chemical Engineering, Purdue Univ., West Lafayette, IN, 47907, USA
SO Science (Washington, D. C.) (1996), 273(5282), 1690-1693
AB Close-packed planar arrays of nanometer-diam. **gold** clusters that are covalently linked to each other by rigid, double-ended org. mols. were self-assembled. **Au nanocrystals**, each encapsulated by a monolayer of alkyl **thiol** mols., were cast from a **colloidal** soln. onto a flat substrate to form a close-packed cluster monolayer. Org. interconnects (aryl dithiols or aryl diisonitriles) displaced the alkyl **thiol** mols. and covalently linked adjacent **clusters** in the monolayer to form a two-**dimensional** superlattice of metal quantum dots coupled by uniform tunnel junctions. Elec. conductance through such a superlattice of 3.7-nm-diam. **Au** clusters, deposited on a SiO₂ substrate in the gap between two **Au** contacts and linked by an aryl di-isonitrile [1,4-di(4-isocyanophenylethynyl)-2-ethylbenene], exhibited nonlinear Coulomb charging behavior.

L19 ANSWER 72 OF 189 CA COPYRIGHT 2005 ACS on STN

- AN 125:178469 CA
TI Nanocrystal gold molecules
AU Whetten, Robert L.; Khoury, Joseph T.; Alvarez, Marcos M.; Murthy,

- Srihari; Vezmar, Igor; Wang, Z. L.; Stephens, Peter W.; Cleveland, Charles L.; Luedtke, W. D.; Landman, Uzi
 CS Sch. Phys. Chem., Georgia Inst. Technol., Atlanta, GA, 30332, USA
 SO Advanced Materials (Weinheim, Germany) (1996), 8(5), 428-33
 AB **Au nanocrystals passivated by self-assembled** monolayers of straight-chain alkylthiolate mols. were obtained as highly purified mol. materials of high intrinsic stability. Evidence is presented for a predicted discrete sequence of energetically optimal fcc. structures of a truncated octahedral morphol. motif. The nanocrystal materials have a propensity to form extended superlattices.
- L19 ANSWER 75 OF 189 CA COPYRIGHT 2005 ACS on STN
 AN 125:152018 CA
 TI Molecular **Self-Assembly** of Aliphatic **Thiols** on **Gold Colloids**
 AU Weisbecker, Carl S.; Merritt, Margaret V.; Whitesides, George M.
 CS Chemistry Department, Harvard University, Cambridge, MA, 02138, USA
 SO Langmuir (1996), 12(16), 3763-3772
 AB **Self-assembled** monolayers (SAMs) were formed on **Au colloids** in 50% aq. EtOH in the presence of alkanethiols (HS(CH₂)_nR, where R represents a series of neutral and acidic functional groups). Chemisorption of **alkanethiols** on the **Au colloids** significantly changes the rates of flocculation of the **Au** dispersions; the magnitudes of these pH-dependent changes are a function of chain length (n) and the terminal functionality (R) in a manner consistent with formation of SAMs on the colloid surface. The reduced rate of dissoln. of **alkanethiol-treated colloids** by wet chem. etchants, TEM, and XPS data further support the formation of SAMs.
- L19 ANSWER 76 OF 189 CA COPYRIGHT 2005 ACS on STN
 AN 125:151912 CA
 TI Highly Oriented Molecular **Ag** Nanocrystal Arrays
 AU Harfenist, Steven A.; Wang, Z. L.; Alvarez, Marcos M.; Vezmar, Igor; Whetten, Robert L.
 CS School of Physics, Georgia Institute of Technology, Atlanta, GA, 30332-0430, USA
 SO Journal of Physical Chemistry (1996), 100(33), 13904-13910
 AB Orientational ordering of faceted nanocrystals in nanocrystal arrays was obsd. directly for the 1st time (using TEM imaging and diffraction to resolve the structure of thin mol.-cryst. films of **Ag nanocrystals passivated by alkylthiolate self-assembled** monolayers). The type of ordering is detd. by the nanocrystal faceted morphol., as mediated by the interactions of surfactant groups tethered to the facets on neighboring nanocrystals. Orientational ordering is crucial for the understanding of the fundamental properties of quantum-dot arrays, as well as for their optimal utilization in optical and electronic applications.
- L19 ANSWER 81 OF 189 CA COPYRIGHT 2005 ACS on STN
 AN 125:124551 CA
 TI Room temperature Coulomb blockade and Coulomb staircase from self-assembled nanostructures
 AU Andres, R. P.; Datta, S.; Dorogi, M.; Gomez, J.; Henderson, J. I.; Janes, D. B.; Kolagunta, V. R.; Kubiak, C. P.; Mahoney, W.; et al.

CS Sch. Chem. Eng., Purdue Univ., West Lafayette, IN, 47907, USA
SO Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films
(1996), 14(3, Pt. 1), 1178-1183
AB The **self-assembly** of well-characterized, nanometer-size **Au clusters** into ordered monolayer arrays spanning several microns was achieved. Techniques to insert mol. wires to link adjacent **clusters** in the **self-assembled** array were developed. "Unit cell" nanostructures formed from individual **Au clusters** supported on a **self-assembled** monolayer film of the double-ended thiol mol. p-xylylene- α,α' -dithiol show evidence for reproducible single electron effects at room temp. when studied by STM. Ests. for the elec. resistance of a single mol. can be obtained from these measurements. The exptl. values for this resistance are in reasonable agreement with theor. calcns. by using the Landauer approach.

$\alpha\beta$ L19 ANSWER 83 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 125:98169 CA

TI From monolayers to nanostructured materials: an organic chemist's view of self-assembly

AU Bethell, D.; Brust, M.; Schiffrin, D. J.; Kiely, C.

CS Department of Chemistry, University of Liverpool, PO Box 147, Liverpool, L69 3BX, UK

SO Journal of Electroanalytical Chemistry (1996), 409(1-2), 137-143

AB Simple methods are described for the prodn. of **Au** nanoparticles with narrow size distributions by redn. of tetrachloroaurate solns. in the presence of thiol-contg. org. compds. which self-assemble on the **Au** surface. Stable solns. of somewhat larger **particles** can be produced if the **thiol** is absent. The thiol-derivatized materials are stable in air over long periods and can be handled in much the same way as simple org. compds. Using dithiols as the derivatizing spacer units, methods were developed for the prepn. of materials in 3-**dimensional** form and as thin films attached to a solid substrate. Such materials show conductivities that mimic the behavior of semiconductors and that depend markedly on the structure of the **dithiol** used to **link** the **Au particles** together. The increase in cond. with increasing temp. probably involves activated electron hopping from particle to particle. Surfaces treated with a coating of the materials show electroreflectance changes with applied potential that also differ according to the structure of the dithiol spacer. Unusual effects were obsd. on heterogeneous electron transfer from electrode surfaces treated with layers of the **Au nanoparticles** and **dithiol** spacers. Applications for these nanostructured materials can be envisaged, which range from submicroelectronic devices and circuitry to elec. modification of the reflectance of glass. Such applications will require a multidisciplinary approach with a substantial org. chem. research input.

L19 ANSWER 84 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 125:45892 CA

TI "Coulomb staircase" at room temperature in a self-assembled molecular nanostructure

AU Andres, Ronald P.; Bein, Thomas; Dorogi, Matt; Feng, Sue; Henderson, Jason I.; Kubiak, Clifford P.; Mahoney, William; Osifchin, Richard G.; Reifengerger, R.

CS Sch. Chem. Eng., Purdue Univ., West Lafayette, IN, 47907, USA

SO Science (Washington, D. C.) (1996), 272(5266), 1323-1325

AB Double-ended aryl **dithiols** [α,α' -xylyldithiol (XYL) and 4,4'-biphenyldithiol] formed self-assembled monolayers (SAMs) on gold(111) substrates and were used to tether nanometer-sized gold clusters deposited from a cluster beam. An ultrahigh-vacuum scanning tunneling microscope was used to image these nanostructures and to measure their current-voltage characteristics as a function of the sepn. between the probe tip and the metal cluster. At room temp., when the tip was positioned over a cluster bonded to the XYL SAM, the current-voltage data showed "Coulomb staircase" behavior. These data are in good agreement with semiclassical predictions for correlated single-electron tunneling and permit estn. of the elec. resistance of a single XYL mol. ($\sim 18 \pm 12 \text{ M}\Omega$).

L19 ANSWER 87 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 124:300856 CA

TI Monolayers in three **dimensions**: synthesis and electrochemistry of ω -functionalized **alkanethiolate-stabilized gold cluster** compounds

AU Hostetler, Michael J.; Green, Stephen J.; Stokes, Jennifer J.; Murray, Royce W.

CS Kenan Laboratories of Chemistry, University of North Carolina, Chapel Hill, NC, 27599-3290, USA

SO Journal of the American Chemical Society (1996), 118(17), 4212-13

AB The synthesis and characterization of **Au cluster** compds. contg. a mixt. of **alkanethiolate** and ω -substituted alkanethiolate ligands are reported. **Cluster** mols. prepd. with **alkanethiolate** ligands, according to previous work, have a $\sim 1.2 \text{ nm}$ radius **Au** core that, modeled as a 309-**Au** atom cubooctahedron, bears a monolayer ligand skin of ~ 95 alkenethiolate chains. The ω -functionalized clusters are synthesized by place exchange reactions in soln. mixts. of **alkanethiolate cluster** mols. and ω -substituted **alkanethiols**, where the ω -substituent can be -Br, -CN, vinyl, or ferrocenyl. The reaction products, according to ^1H NMR spectroscopy, include cluster mols. with as many as 44 bromide and 15 ferrocenyl ω -substituents. Steric ω -substituent interactions appear to constrain the extent of place exchange. Ferrocenyl-substituted clusters are electroactive in CH_2Cl_2 solns. as adsorbed monolayers and as diffusing solutes. The mass transport behavior indicates that as many as 15 ferrocene units in a substituted cluster mol. can be oxidized at an electrode surface over a potential range as narrow as that required to oxidize a ferrocene monomer, i.e., the cluster has promise as a reagent that delivers multiple equiv. of redox activity at nearly identical formal potentials. The **Au** cores of the clusters also exhibit "double layer" charging behavior and are thus true mol.. "nanoelectrodes".

L19 ANSWER 92 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 124:42310 CA

TI Novel gold-**dithiol** nano-networks with non-metallic electronic properties

AU Brust, Matias; Bethell, Donald; Schiffrin, David J.; Kiely, Christopher J.

CS Dep. Chem., Univ. Liverpool, Liverpool, L69 3BX, UK

SO Advanced Materials (Weinheim, Germany) (1995), 7(9), 795-7

AB Two new prepn. techniques are reported leading to composite materials, which comprise nanometer sizes **Au particles self-assembled** into a 3-dimensional network by org. **dithiols**. Au clusters with particle size of 2.2 nm were prepd. in a 2-phase liq.-liq. system with di-Et ether as solvent and with 1,5-pentanedithiol, 1,6-hexanedithiole, and p-xylylenedithiole as stabilizing ligands. Colloids with a size of 8 nm were prepd. using toluene as solvent without **thiol** and a subsequent reaction with the **dithiols**. The electronic properties are nonmetallic and adjustable via particle size and interparticle spacing depending on the **dithiol**.

αβL19 ANSWER 93 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 124:38546 CA

TI Monolayers in Three **Dimensions**: NMR, SAXS, Thermal, and Electron Hopping Studies of **Alkanethiol Stabilized Gold Clusters**

AU Terrill, Roger H.; Postlethwaite, Timothy A.; Chen, Chun-hsien; Poon, Chi-Duen; Terzis, Andreas; Chen, Aidi; Hutchison, James E.; Clark, Michael R.; Wignall, George; et al.

CS Kenan Laboratories of Chemistry, University of North Carolina, Chapel Hill, NC, 27599-3290, USA

SO Journal of the American Chemical Society (1995), 117(50), 12537-48

AB **Au clusters stabilized** by chemisorbed monolayers of octane-, dodecane-, or hexadecanethiolate were studied in soln. and in the solid phase. These materials can be pumped free of solvent to form a dark brown solid that can be re-dissolved in nonpolar solvents. Their exceptional stability suggests that they may be viewed as cluster compds. The **self-assembled alkanethiolate monolayers stabilizing the metal clusters** can be studied by using techniques that are insufficiently sensitive for study of a monolayer on a flat surface (e.g., ¹H and ¹³C NMR, elemental anal., DSC, thermogravimetry (TGA), diffusion-ordered NMR spectroscopy (DOSY)). Results from such measurements (combined with SAXS data on solns. of the clusters and AFM and STM images) are consistent with a small, monodisperse (12 Å radius) **Au** core, which modeled as a sphere contains ~ 400 **Au** atoms and ~ 126 alkanethiolate chains, or if modeled as a cuboctahedral structure contains 309 **Au** atoms and ~ 95 alkanethiolate chains. High-resoln. NMR spectra of cluster solns. display well-defined resonances except for methylenes nearest the **Au** interface; the absence of the latter resonances is attributed to a combination of broadening mechanisms based on the discontinuous change in magnetic susceptibility at the metal-hydrocarbon interface and residual dipolar interactions. Films of the dry, solid cluster compd. on interdigitated array electrodes exhibit current-potential responses characteristic of electron hopping cond. in which electrons tunnel from **Au** core to **Au** core. The electron hopping rate decreases and the activation barrier increases systematically at longer alkane chain length. The results are consistent with electron transport rate control being a combination of thermally activated electron transfer to create oppositely charged **Au** cores (cermet theory) and distance-dependent tunneling ($\beta = 1.2 \text{ Å}^{-1}$) through the oriented alkanethiolate layers sepg. them.

L19 ANSWER 98 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 123:94218 CA

TI Organization of **Au** Colloids as Monolayer Films onto ITO Glass Surfaces: Application of the Metal Colloid Films as Base Interfaces To Construct Redox-Active Monolayers

AU Doron, Amihod; Katz, Eugenie; Willner, Itamar

CS Institute of Chemistry, Hebrew University of Jerusalem, Jerusalem, 91904, Israel

SO Langmuir (1995), 11(4), 1313-17

AB **Gold** colloid films are organized on In Sn oxide (ITO) surfaces by using (aminopropyl)siloxane or (mercaptopropyl)siloxane as base monolayer for the deposition of the metal colloid. Different **Au** colloids (ranging in particles of diams. 25, 30, 35, and 120 nm) were deposited on the monolayer-modified ITO surfaces. For the small particles (25 nm), an almost continuous **Au** colloid film is formed with interparticle spacing of 10-25 nm. The surface coverage of the **Au** colloid on the (aminopropyl)siloxane monolayer is higher than that for the (mercaptopropyl)siloxane-modified ITO. The **Au** colloid films provide active surfaces for the **self-assembly** of redox-active thiolate monolayers. 8-(N-Methyl-4,4'-bipyridinyl)octanoic acid was covalently linked to a cystamine monolayer assembled on the **Au** colloids. For the 25 nm **Au** colloid, the surface coverage by the redox active unit (6.8×10^{-10} mol cm⁻²) is ~ 12-fold higher than that of the (aminopropyl)siloxane monolayer-modified ITO (lacking the **Au** film). The surface coverages of the **Au** colloid films by the bipyridinium monolayers increase as the colloid particle sizes decrease.

L19 ANSWER 99 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 123:18732 CA

TI Self-assembled metal colloid monolayers: an approach to SERS substrates

AU Freeman, R. Griffith; Grabar, Katherine C.; Allison, Keith J.; Bright, Robin M.; Davis, Jennifer A.; Guthrie, Andrea P.; Hommer, Michael B.; Jackson, Michael A.; Smith, Patrick C.; et al.

CS Division Science, Northeast Missouri State University, Kirksville, MO, 63501, USA

SO Science (Washington, D. C.) (1995), 267(5204), 1629-31

AB The **self-assembly** of monodisperse **Au** and **Ag** colloid particles into monolayers on polymer-coated substrates yields macroscopic surfaces that are highly active for surface-enhanced Raman scattering (SERS). Particles are bound to the substrate through multiple bonds between the colloidal metal and functional groups on the polymer (e.g., cyanide (CN), **amine** (NH₂), **thiol** (SH)). Surface evolution (which can be followed in real time by UV-visible spectroscopy and SERS) can be controlled to yield high reproducibility on both the nanometer and the centimeter scales. On conducting substrates, colloid monolayers are electrochem. addressable and behave like a collection of closely spaced microelectrodes. These favorable properties and the ease of monolayer construction suggest a widespread use for metal colloid-based substrates.

αL19 ANSWER 100 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 122:323151 CA

TI Preparation and Characterization of **Au** Colloid Monolayers

AU Grabar, Katherine C.; Freeman, R. Griffith; Hommer, Michael B.; Natan,

Michael J.

CS Department of Chemistry, Pennsylvania State University, University Park,
PA, 16802, USA

SO Analytical Chemistry (1995), 67(4), 735-43

AB The design and initial characterization of 2-**dimensional** arrays of colloidal **Au** particles are reported. These surfaces are prep'd. by **self-assembly** of 12 nm diam. **colloidal Au particles** on immobilized polymers having pendant functional groups with high affinity for **Au** (i.e., CN, SH, NH₂). The polymers are formed by condensation of functionalized alkoxysilanes on cleaned quartz, glass, and SiO₂ surfaces. The assembly protocol is carried out completely in soln.; cleaned substrates are immersed in methanolic solns. of organosilane, rinsed, and subsequently immersed in aq. colloidal **Au** solns. The 2-**dimensional** arrays form spontaneously on the polymer surface. The resulting substrates were characterized by UV-vis spectroscopy, TEM, and surface-enhanced Raman scattering (SERS). The TEM data show that the particles are sep'd. spatially, but are close enough to interact electromagnetically (small spacing compared to λ). The UV-vis data show that collective particle surface plasmon modes are present in the 650-750 nm region, suggesting that these assemblies are SERS-active. This is indeed the case, with enhancement factors of roughly 104. The **Au** colloid monolayers possess a set of features that make them very attractive for both basic and applied uses, including uniform roughness, high stability, and biocompatibility.

L19 ANSWER 110 OF 189 CA COPYRIGHT 2005 ACS on STN

AN 120:120414 CA

TI Composite materials containing nanoscalar particles, process for producing them and their use for optical components

IN Spanhel, Lubomir; Arpac, Ertugrul; Nass, Ruediger; Schmidt, Helmut

PA Institut fuer Neue Materialien Gemeinnuetzige G.m.b.H., Germany

SO PCT Int. Appl., 25 pp.

PI WO 9307179 A2 19930415 WO 1992-EP2327 19921009

US 5470910 A 19951128 US 1994-211431 19940628

PRAI DE 1991-4133621 A 19911010

AB The title materials are prep'd. by producing a **stabilized** sol. of nanoscale **particles** by reacting in an org. solvent (1) a sol. comp'd. of a metal from groups 6-15 of the periodic table or a lanthanide, (2) a pptg. agent which forms an antimonide, arsenide, chalcogenide, halide, or phosphide with the metal from 1, and (3) a **bifunctional** comp'd. which has ≥ 1 electron pair donor group and ≥ 1 group transformable by polymn. or polycondensation into an org. or inorg. network, then mixing the sol. with (4) a thermally or photochem. curable or polymerizable comp'd. and (5) a polymn. initiator, hydrolyzing and polycondensing the network-forming groups, and curing the material. The use of transparent composites, in the form of films or ass shaped articles, for optical elements is described.

L19 ANSWER 123 OF 189 CA COPYRIGHT 2005 ACS on STN

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TI Semiconductor **nanocrystals** covalently bound to metal surfaces with **self-assembled** monolayers

AU Colvin, V. L.; Goldstein, A. N.; Alivisatos, A. P.

CS Dep. Chem., Univ. California, Berkeley, CA, 94720, USA
SO Journal of the American Chemical Society (1992), 114(13), 5221-30
AB A method is described for attaching semiconductor **nanocrystals** to metal surfaces by using **self-assembled difunctional** org. monolayers as bridge compds. Three different techniques are presented. Two rely on the formation of self-assembled monolayers on **Au** and **Al** in which the exposed tail groups are thiols. When exposed to heptane solns. of Cd-rich **nanocrystals**, these free **thiols** bind the Cd and anchor it to the surface. The third technique attaches nanocrystals already coated with carboxylic acids to freshly cleaned **Al**. The nanocrystals, before deposition on the metals, were characterized by UV-visible spectroscopy, x-ray powder diffraction, resonance Raman scattering, TEM, and electron diffraction. Afterwards, the nanocrystal films were characterized by resonance Raman scattering, RBS, contact angle measurements and TEM. All techniques indicate the presence of quantum confined clusters on the metal surfaces with a coverage of ~ 0.5 monolayers. These samples represent the first step toward synthesis of an organized assembly of clusters as well as allow the first application of electron spectroscopies to be completed on this type of cluster. As an example of this, the first XPS spectra of semiconductor nanocrystals are presented.

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